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Worldwide Report

**NUCLEAR DEVELOPMENT  
AND  
PROLIFERATION**

**FBI** FOREIGN BROADCAST INFORMATION SERVICE

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# NOTICE

The following selections from Soviet media on the aftermath of the Chernobyl Nuclear Power Plant accident and the mobilization of labor and technology in the clean-up effort will be published in the series USSR REPORT: POLITICAL AND SOCIOLOGICAL AFFAIRS under the subtitle AFTERMATH OF CHERNOBYL NUCLEAR POWER PLANT ACCIDENT. This is a representative list of the items selected for that report.

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NUCLEAR DEVELOPMENT AND PROLIFERATION

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WORLDWIDE AFFAIRS

ASIA GETS SWEDISH INSTRUMENT FOR MAKING NUCLEAR WEAPONS

Stockholm DAGENS NYHETER in Swedish 28 Apr 86 p 8

[Article by Bo G. Andersson: "FOA Warned of Nuclear Weapons Technology Sold Abroad"]

[Text] For a number of years Sweden has been exporting a measuring instrument to the third world that may be used in the production of nuclear weapons.

The instrument, a so-called flash X-ray aggregate, has been sold to countries like India and Pakistan suspected of planning industrial production of nuclear weapons. This was confirmed for DAGENS NYHETER by Defense Research Institute (FOA) sources.

At the end of the seventies the United States and other nuclear weapons powers repeatedly warned Sweden that its exportation of flash X-ray equipment could lead to the proliferation of nuclear weapons. But the Swedish government did not gain control of these sales until 1984 when the product became subject to legislation governing the exportation of nuclear technology goods.

Central Role

"The flash X-ray instrument plays a central role in the production of all nuclear weapons. Hence, there is reason to take another look at the product in discussing the risk of nuclear weapons proliferation," said Nils Gylden, head of the Defense Ministry's Security Policy Unit and one of Sweden's top nuclear weapons experts.

India, Pakistan, Taiwan, South Korea and Singapore are some of the countries that purchased flash X-ray aggregates from Sweden between 1977 and 1984.

The equipment can be used to photograph the extremely rapid course of explosions in a nuclear charge, but it also has various uses in conventional weapons research and in the civilian sector.

"It is very important to control the sale of this type of technology. Sweden must be careful not to add to the proliferation of nuclear weapons in the world through its exportation," said Gylden.



During the early sixties Gylden was engaged in nuclear weapons research for FOA in Grindsjon, south of Stockholm.

At that time he was personally involved in developing the flash X-ray technology in close cooperation with Uppsala University researchers.

#### Conventional

"This product was developed partly for its importance to nuclear weapons research and partly to facilitate research on various conventional weapons, such as optimizing the effectiveness of new highly explosive shells, for example," said Gylden.

Nils Robert Nilsson, an Uppsala University physics lecturer, is among the inventors of the flash X-ray instrument.

"Sweden was forced to get involved in basic nuclear weapons research in order to understand what the super powers were engaged in. This is why FOA funded the project," said Nilsson.

However, the climate changed quickly since Sweden was among the first nations to sign the so-called Nuclear Nonproliferation Treaty in 1968.

FOA definitely suspended Swedish nuclear bomb research for a few years in the early seventies. Instead, Gylden and his colleagues began to pursue the risks of nuclear weapons proliferation.

#### FOA Investigating

All the nations that signed the Nuclear Nonproliferation Treaty pledged to control their own production and exportation of nuclear technology in order to reduce the risk of nuclear weapons proliferation. FOA's task now became investigating individual countries' need for high-technology equipment to initiate the production of nuclear weapons.

"We established that it was not only important to regulate the trade of fission materials, reactors, etc.; even flash X-ray aggregates and other instruments would have to be controlled so as to prevent them from getting into the wrong hands," said Gylden.

In 1968 FOA sold its patent on the flash X-ray aggregate to Scanditronix, an Uppsala-based company formed by a group of Uppsala University physicists.

Scanditronix began to market the product in earnest worldwide in the mid-seventies.

At the same time, anxiety was growing within FOA that this exportation might contribute to the proliferation of nuclear weapons.

## Secret Reports

Among other things, FOA's concern was based on several secret reports issued by the intelligence services of the nuclear weapons powers, according to DN sources. According to the information provided, several third world countries were anxious to purchase Scanditronix's new product with the intention of producing their own nuclear bombs. This was considered to be a leading world technology; there was only one competitor on the world market, the U.S. data giant Hewlett Packard.

"The United States strongly hinted that Scanditronix's flash X-ray equipment was getting into the wrong hands. But there is no proof that the equipment was used in the production of nuclear weapons," said an FOA source, who wished to remain anonymous.

When FOA saw how Scanditronix was continuing to market its product abroad and was successful in selling several of the aggregates, the FOA2 Department of Physics and Nuclear Technology compiled a secret report, which was sent to the National Nuclear Inspection Agency.

This was in 1979. In its report FOA recommended that the government introduce controls on the exportation of flash X-ray instruments due to the risk of proliferation.

The National Nuclear Inspection Agency immediately contacted the Ministry of Industry, and the Ministry of Foreign Affairs was also advised. Hence, by this time the government was fully informed about how Swedish nuclear weapons experts viewed the problem.

In spite of this, it took another 5 years before Scanditronix's exports became subject to legislative controls. During this period sales continued to the third world countries, among others.

The Nuclear Legislative Committee, which was appointed to review all nuclear legislation, did not even mention the issue in its report submitted during the summer of 1983.

## Paid Attention

FOA, therefore, pointed out in its response to the report 15 June 1983 that there is "other equipment of great importance to the nuclear loading program, but which is not wholly or even primarily used as nuclear technology."

FOA was alluding to the flash X-ray equipment. The government paid attention and regulated the exportation through legislation governing nuclear technology goods, which took effect in April 1984.

Scanditronix now has to get government approval to export all aggregates over 500 kilovolts.

### Equipment Not Used for Nuclear Weapons

"Our flash X-ray equipment does not contribute to a greater proliferation of nuclear weapons in the world. What FOA and others are saying can be qualified as nonsense."

This statement was made by the management of Scanditronix Inc., an Uppsala-based company, whose exportation of flash X-ray equipment has been severely hampered by the new legislation governing nuclear technology goods.

"The flash X-ray equipment we produce is a low-voltage instrument, 1,200 kilovolts at the most. Such instruments are not used in the production of nuclear weapons and there is no risk of our contributing to the proliferation of nuclear weapons," said Arne Mattsson, deputy director of Scandiflash, a Scanditronix subsidiary.

### Follow-Up Service

"Nuclear weapons powers use flash X-ray equipment of between 8,000 and 30,000 kilovolts in their production of nuclear weapons. We have never made that powerful an instrument," said Mattsson.

According to Mattsson, Scandiflash has sold flash X-ray aggregates to some 20 countries throughout the world. He confirmed that this included India and Pakistan.

"Our instruments are only used for research in connection with conventional weapons systems. We know exactly where and how India and Pakistan are using this equipment because we have been responsible for follow-up service on the equipment for a long time."

Mattsson is very displeased with the new legislation on nuclear technology goods, in which flash X-ray equipment is explicitly described as a "risk product" from a nuclear-weapons proliferation point of view. Regulations state that the company must get government approval before exporting any aggregate over 500 kilovolts.

"This legislation is the result of pressure on the Swedish government from the United States in particular. In spite of the fact that this is a completely Swedish product, the United States wants to halt all exportation for strategic reasons. This is part of its embargo policy with respect to the Eastern block," he said.

Scandiflash exports approximately 15 to 20 instruments per year. Last year the company recorded sales of 8 million kronor. Since the export control legislation was enacted in 1984, the company has applied for an export permit four times. The government has approved exportation of the equipment to Bulgaria, Italy and England.

## Disagreement About Voltage

In the production of nuclear weapons the flash X-ray equipment is used to study the extremely rapid ten-thousands of a second course during which the plutonium is being compressed in the loading chamber and a series of flash electrons are being initiated. With the aid of this instrument, one can learn what is necessary in terms of conventional explosives which encircle the fission elements.

The instrument consists of a high-voltage generator and an X-ray tube and is quite simply an ultra high-speed camera. The higher the voltage, the faster the event is registered on the film.

The flash X-ray instrument is also used to study the explosive effect of projectiles. Sheet-metal requirements for the S tank were developed in this manner.

Scandiflash flash X-ray instruments have almost exclusively been used for military purposes. However, two of the instruments sold are being used for civilian purposes, to study driver reactions to collisions in which the body is suddenly thrust forward.

Nuclear weapons experts differ on the voltage necessary to use the instrument in connection with nuclear weapons. Anders Froman, the leading FOA expert in the field, does not even exclude equipment under 500 kilovolts (freely exported) for this purpose. "Of course, its effectiveness is reduced, but it would still be of interest to a country that cannot obtain a higher-voltage aggregate," he said.

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HONG KONG

## CHERNOBYL ACCIDENT SPARKS CONCERN OVER DAYA BAY

### Independent Study Urged

Hong Kong SOUTH CHINA MORNING POST in English 9 May 86 p 14

#### [Text]

The Government should set up an independent investigation body to scrutinise all research reports on the Daya Bay nuclear plant, a coalition of environmental groups said yesterday.

The body, which should include representatives from the public, could re-examine health and safety risks, effects on environmental conservation and likely economic gains, to decide if construction of the plant should go ahead, the groups said.

The Committee of Concern for Nuclear Energy said major research reports on the plant had never been made

public.

Financial Secretary Sir John Bremridge said in the Legislative Council meeting on Wednesday that one of five Government-commissioned studies, undertaken by the UK Atomic Energy Authority on the probability of accidents at the nuclear power station and the consequences for Hongkong, had yet to be completed.

A member of the committee, Mr Fung Chi-wood, said the Daya Bay project should be frozen pending the completion of the study.

He also asked if the Government had a contingency plan, in case of disaster, to

evacuate the more than one million Hongkong people who now live within an emergency evacuation zone.

Mr Fung also claimed that the nuclear reaction processes for generating electricity at the Daya Bay plant and the Chernobyl plant in Russia were the same.

The protection shield may not be able to resist the enormous pressure from the plant's core during a meltdown, he said.

Mr Fung added the group would put its case to Umelco next week, and to back it with a petition campaign and a forum to discuss the Daya Bay plans.

### Appeal Conveyed to Beijing

Hong Kong HONGKONG STANDARD in English 16 May 86 p 5

#### [Text]

A GROUP of local intellectuals yesterday published a full-page advertisement in a Chinese economic newspaper to voice their anti-nuclear views.

The advertisement was published in response to the recent spate of nuclear accidents around the world. It cost about \$10,000, including typesetting and publication.

The cost will be borne by

167 supporters, who jointly signed the statement.

One of the organisers, a social science lecturer in Hongkong Lingnan College, Dr Stephen Lau, said the group believed it was time they expressed their views on the global issue.

"We rushed to organise (the voicing of the views) within a week and we are satisfied that more than 100 people supported us, in

view of the short notice," Dr Lau said.

The supporters include lecturers from University of Hongkong and Chinese University such as Mr Yeung Sum and Dr Lam Man-ping and Dr Stephen Tang, and lecturers and teachers of post-secondary colleges and secondary schools.

In the gently-worded advertisement, supporters

urged the Government to publish details and safety assessment reports of the Daya Bay plant.

Earlier, the Government gave its assurance that everything about the plant would be made "transparent."

Dr Lau said the demands were made because many doubts regarding the nuclear plant had not been cleared.

The advertisers said the plant should not be operated unless it has the support of Hongkong residents, who will have to suffer should any mishap occur at the plant.

They also appealed to the Chinese authorities to review the policy of nuclear power development.

"The moderate manner that we used to express our demands is the general attitude of intellectuals in handling issues," Dr Lau explained.

"We hope to arouse public attention on the nuclear plant issue and we also hope the local Government will respect public opinions by disclosing more information on the subject," he said.

Dr Lau is confident that the local branch of Xinhua

news agency will convey their appeal to the Chinese Government.

The group plans to publish the advertisement again in about two weeks' time, he said.

One of the supporters, Mr Yeung Sum, said he hoped the advertisement would help to drive home the message that there is a need to have an open government which is accountable to the public.

"The concern of local residents focused on economic and political issues in the past. Now they should try to pay more attention to environmental safety."

### Environmental Panel's Role

Hong Kong HONGKONG STANDARD in English 24 May 86 p 2

[Text]

A FORMER member of the Environmental Protection Advisory Committee (EPCOM), says Epcom should discuss the proposed Daya Bay nuclear power plant, to be built in China, just north of Hongkong by 1992.

Mr Henry Litton, QC, who was taken off Epcom in 1984, has written letters recently saying that in the past, attempts by Epcom members to discuss Daya Bay "have been frustrated on the grounds that it was outside EPCOM's terms of reference."

After the Chernobyl nuclear accident, the Financial Secretary, Sir John Bremeridge, pledged an end to

secrecy surrounding Daya Bay, and Mr Litton says no one should be appointed to Epcom without an assurance that Daya Bay will be included in its terms of reference.

In response to Mr Litton's suggestions, Mr John Chambers, Secretary for Health and Welfare, said it is not taboo to discuss Daya Bay during Epcom meetings.

"Epcom has been briefed in the past about Daya Bay," said Mr Chambers. "There is no reason not to give more information if that is what they want."

If Epcom is looking at health problems, and "different types of pollution," Mr Chambers questioned whether the committee should discuss Daya Bay, which has not been built yet.

"Epcom is supposed to look at certain problems

and Daya Bay is not something that falls within the scope of Epcom," he said. "But, it is also up to Epcom to say what it wants to discuss. There has been no request for the committee to discuss it further. That should be raised by the chairman."

But Epcom chairman Mr Gerry Forsgate said Epcom "has a lot on its plate" discussing air, water and noise pollution, and he would like to see a committee of experts established to discuss Daya Bay.

"God knows we have enough (environmental) problems in Hongkong. We don't have the expertise or the technology of radiation. It should be referred to a special committee."

"Discussing nuclear problems and radiation problems requires the attention of high-powered people on a special committee," he said.



## Information to Public

Hong Kong SOUTH CHINA MORNING POST in English 25 May 86 p 3

**[Text]** BOTH the Government and operators of the Daya Bay plant are looking at ways to speed up their campaign to help educate the public about nuclear power.

The Government was close to completing its campaign, intended to start three or four years before Daya Bay goes into operation in 1992, when the Chernobyl disaster occurred on April 28.

The campaign timetable has been thrown forward under a shower of public questioning since Chernobyl.

The Guangdong Nuclear Joint Venture Company (JVC) also is looking at what measures it can take to provide informa-

tion on the Daya Bay project.

An engineer from JVC said by telephone yesterday the company may produce a brochure covering a wide range of aspects, including building specifications.

Only 10 days before the Chernobyl disaster, members of the Government's Economic Services Branch, the Royal Observatory, the Medical and Health Department, Education Department and Government Information Service discussed possible strategy.

The plans were based on advice from the Atomic Energy Agency (AEA) of Britain which

the Government engaged in November.

"We now have to revise our timetable - people want more information and they should be given it," said Mr Canice Mak, principal assistant secretary of the Economic Services Branch.

Mr Mak is also a member of the working group looking at the safety and environmental aspects of Daya Bay.

The group is discussing whether or not it is necessary to ask an AEA expert to visit Hongkong.

## Soviet Errors To Be Avoided

Hong Kong SOUTH CHINA MORNING POST in English 9 May 86 p 2

**[Editorial]**

**[Text]**

In his lengthy reply to the Legislative Council on the safety measures against a possible radiation leak from the Daya Bay nuclear plant, Sir John Bremridge made trenchant criticisms of Soviet Russia's excessive secrecy and incompetence over the Chernobyl meltdown.

It is a factor which deserves to be emphasised, not to rub salt in Russia's grievous nuclear wound, but for the sake of all who will be involved in administering the Daya Bay plant.

What must be the first concern of all who run such projects is the well-being, safety and protection of nearby communities. Whether these are Russian, Chinese or Hongkong people is immaterial.

The Soviet Government and its media are now beginning to admit that the dimensions of the Chernobyl disaster were very much more serious than at first indicated, that people were panic-stricken, that thousands were belatedly evacuated and that there was widespread concern and anxiety among the populace, with queues outside railway stations and airline booking offices.

It would be surprising indeed if the Russians were able to suppress instincts common to all humanity. If people living in the West who are exposed much more to the arguments of articulate pressure groups and the counter arguments of nuclear protagonists can be concerned at the danger they face, how much more so in a closed community where there is greater ignorance and fear of the unknown.

What happened, however, should be an object lesson not just to the Russians and the East Europeans on

how fear of exposure can blind a few misguided people to their obligations to humanity, but to all communities obsessed by the quest for watertight security.

As far as the Daya Bay project is concerned, Hongkong is as much concerned about structural weaknesses, material faults and chemical reactions as human error. Perhaps the last is the greatest danger, as Chernobyl revealed. For the most efficient warning systems are useless if those in charge refuse to heed them and take immediate and decisive action.

Those who tried to conceal the disaster at Chernobyl were guilty of criminal negligence of the highest order, for in foolishly trying to suppress the extent of the disaster they not only exposed their own people, neighbours and families, but discredited their own Government which had to be told by monitoring stations 1,000 kilometres away and by spy satellite pictures received in the United States the true nature of the disaster.

Is there any way Hongkong can be assured that this will not happen at Daya Bay? For while it may take time to evaluate the degree of any mishap, it is far better that precautions against contamination or fallout are taken immediately - even if in the event it is seen as premature and an overreaction. Better that lives are saved than jeopardised to save an official's face.

What Hongkong must ask is for the duplication of all automatic monitoring systems in both our own territory as well as in the Daya Bay plant, so that independent conclusions can be drawn and that we do not have to wait for a tardy finger to reach for the red button after hours of futile indecision.



HONG KONG

DANGERS FROM NUCLEAR SHIPS, WEAPONS IN HONG KONG WATERS

Hong Kong SUNDAY STANDARD in English 25 May 86 p 4

[Article by Tim Hamlett, Stephen Morgan, Annie Lam, and Ivan Lo]

[Text]

WHILE there has been mounting public concern about the possibility of a nuclear power station in Daya Bay, there has been little awareness of the passage through Hongkong of several nuclear reactors a year and an undisclosed number of atomic bombs.

This floating nuclear armoury comes to Hongkong by courtesy of the US Navy, which uses the port as a rest and recreation stop.

Something like one percent of Hongkong's tourist industry income is provided by visiting US sailors, who made 99,000 visits last year (including repeat visits).

Last year's visiting fleet, which ranged from tugs and training ships to nuclear submarines and a (conventionally powered) aircraft carrier, numbered 63 ships, again including a few repeaters.

Quite how many of these vessels carried nuclear weapons is a delicate topic.

Nuclear propulsion is harder to hide. We can state with complete confidence that six of last year's visiting vessels contained functioning nuclear reactors.

They were nuclear-powered hunter-killer submarines.

The US government refuses as a point of principle to say which of its ships visiting foreign ports carry nuclear weapons, on the grounds that such information would be useful to an enemy.

This refusal has resulted in the cancellation of plans for port visits to Shanghai, a full-scale row with New Zealand, and occasional strained relationships with Japan.

The official justification offered seems slender. The naval tight lips may have more to do with preserving the polite fiction that US ships never carry nuclear weapons in Japanese waters.

Seekers after information in this misty area

are actually quite well catered for by the published material.

The estimates which follow are based on information provided in *Jane's Fighting Ships*, *Jane's All the world's Aircraft*, and *The Military Balance*, an annual summary of the world's armed forces published by the International Institute for Strategic Studies in London.

Of last year's 63 visits, 34 were by vessels on which it would be surprising to find nuclear weapons, and which are not fitted with equipment to launch or fire them.

These ships are tugs, amphibious warfare vessels of various kinds, training ships, survey ships, supply tenders and so forth.

The remaining 29 more belligerent boats include six which appear from published material to carry no equipment or armament involving nuclear weapons, and one of which we remain unsure.

That leaves 22 visits from vessels which are equipped to fire nuclear devices, either as bombs, missiles, torpedoes or depth charges.

Five of the six nuclear-powered submarines are fitted with the SUBROC homing torpedo system, which is only available with a nuclear tip.

Most of these submarines are also being fitted with Cruise missiles, launched vertically from a silo in the deck. One of last year's visitors had already been equipped in this way.

Last year's aircraft carrier was not nuclear-powered (she is based in Japan). However, like all US main battle carriers she flies a bombing wing of 34 aircraft.

Depending on the type of aircraft on the carrier concerned, these bombers will be fitted to carry from two to four nuclear bombs each.

Such carriers also have a squadron of helicopters capable of dropping the S-3 nuclear depth-charge on hostile submarines.

Bearing in mind that the outbreak of a nuclear war is unlikely to permit wholesale

rearming of distant carriers, it seems likely that such a vessel will carry some 50 nuclear devices, and those flying the A-7 bomber will require rather more to mount just one fully armed nuclear attack.

Two of the six carriers usually stationed in the Pacific have nuclear propulsion. The *Enterprise* has eight reactors, the *Carl Vinson* only two.

Guided missile cruisers, of which one visited us last year, are armed with the Standard surface-to-air missile, and also with a device called ASROC, which is a sort of rocket-propelled depth-charge.

Both these weapons are capable of carrying a nuclear or conventional warhead, according to need.

The ASROC system is also found on most destroyers and frigates. Eight tubes are the standard fitting.

Some destroyers are also being fitted with the *Tomahawk* cruise missile — a naval version of the weapon causing so much controversy in Europe.

Two of last year's visitors are said to carry four of these missiles each.

The published information is not very helpful on the extent to which nuclear warheads are expected to be used in practice.

A list compiled in Washington using the previous year's *Jane's* and *Nuclear Weapons Databook* (an unofficial publication) included all our nuclear "suspects" as carrying nuclear weapons.

It appears that the amount of nuclear material passing through Hongkong in US Navy ships is going to increase (at least until 1997).

The present policy is to give the Atlantic Fleet the lion's share of the new equipment, so that current programmes to upgrade the Fleet have been slow to produce new specimens of naval armament in Hongkong.

More guided missile cruisers can be expected than last year's solitary visitor as the US Navy approaches its target of having two of these vessels to escort each carrier or battleship.

Current plans call for an increasing reliance on nuclear carriers, and a complete phasing out of "conventional" submarines.

Further deployment of cruise missiles on small ships like destroyers and frigates is also part of current naval strategy.

What does all this mean for Hongkong, apart from making it a tempting nuclear target in the Third World War?

The combined effect of visits from nuclear powered ships is that, for about a month of every year, there is at least one functioning nuclear reactor floating in the harbour.

American ship-borne reactors require a constant flow of sea-water as a coolant. No serious radiation leaks from this source have been reported, but this may owe something to military reticence.

The safety record of civilian nuclear-powered ships was bad.

Bombs, missiles, and depth charges are carefully designed to avoid accidental explosions. There is no record of such an accident.

Even in a case where a bombe jettisoned its load over southern Spain there was no nuclear explosion (though contamination was a problem).

Still, even the best-run navies occasionally suffer from collisions, accidental groundings, fires on board and submarines which refuse to surface.

The US Navy's intermittent presence in Hongkong waters implies some risk of an accident of this kind, complicated by the presence of nuclear material, either as a propellant or an explosive.

The worst conceivable case would probably be a collision involving a nuclear-powered submarine which subsequently sank.

Measures would then be needed to retrieve two different kinds of nuclear weapon, and to make the submerged reactor safe.

This would require an unusual combination of skills which would probably have to be supplied by the US Navy itself.

/9274

CSO: 5150/0119

JAPAN

DIET APPROVES NUCLEAR ENERGY ACCORD WITH PRC

OW210313 Tokyo KYODO in English 0259 GMT 21 May 86

[Text] Tokyo, May 21 KYODO--The Diet Wednesday approved a Japan-China agreement to provide Japanese cooperation to China's peaceful use of nuclear power. In an upper house plenary session, the Liberal-Democratic, Komeito, and Democratic Socialist Parties voted for the agreement. The measure had already been passed by the lower house.

Under the agreement, Japan will cooperate with China to research and application of radioactive isotopes and design, construction, and operation of nuclear reactors and disposal of radioactive waste. The agreement also prohibits China from diverting nuclear substances exported by Japan to China to development and production of nuclear arms.

The agreement was signed between Japanese Foreign Minister Shintaro Abe and his Chinese counterpart Wu Xueqian at the fourth Japan-China ministerial meeting last July. The Japan Socialist Party opposed the agreement in both lower and upper houses in light of the Chernobyl nuclear accident in the Soviet Union in late April.

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CSO: 5160/066

PEOPLE'S REPUBLIC OF CHINA

PRC OFFICIAL DISCUSSES CHERNOBYL, DEVELOPMENT OF NUCLEAR INDUSTRY

HK281145 Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 21 26 May 86 pp 4-5

[Article by Zhang Chunting: "The Nuclear Accident in the Soviet Union and the Nuclear Power Development Plan in China--Zhou Ping, the Deputy Head of the Leading Group for Nuclear Power Plants Under the State Council, Answers Questions Raised by a LIAOWANG Reporter"]

[Text] The Soviet Union's Chernobyl accident in the Ukraine in late April caused a worldwide shock with ongoing repercussions. This reporter recently interviewed Zhou Ping, deputy head of the PRC State Council's Nuclear Power Leading Group and vice minister of the nuclear industry regarding the Chernobyl disaster.

The 54-year-old Zhou Ping returned to China in 1958 after completion of his study abroad. Since then, he has been engaged in physical calculations and experimentation regarding nuclear reactors, as well as in the design, regulation and operation of reactors. He is a senior engineer and specialist of the PRC Ministry of Nuclear Industry, vice chairman of the PRC Nuclear Academic Society Council, and a council member of an international atomic energy body.

How Should We View the Soviet Union's Nuclear Disaster?

This reporter asked Vice Minister Zhou Ping: In your opinion, how should we view the Soviet Union's recent nuclear accident?

Zhou Ping said: The Soviet Union's recent nuclear accident was as unexpected as disastrous. Just as Dr Hans Blix, director of the International Atomic Energy Authority pointed out on 9 May: "This has been the most disastrous nuclear accident to date in the world, because the radioactive material leaked in this accident is greater in volume and far more serious than any other major accidents in the past." The meltdown of the uranium fuel rods was serious enough, and the radioactive material leaked in great volume has demonstrated that the accident was extremely grave. We have not yet read any formal report on the primary cause that led to the accident. According to the Soviet Union's initial report, some chemical explosion had damaged the water-circulation system and ignited fuel rods and graphite bricks which gradually led to a major accident.

Here we should point out emphatically that the pressurized graphite tube slow boiling-water reactor adopted by the Chernobyl power plant was an early model, which was entirely different from the pressurized-water reactor adopted by most countries in nuclear power plants. Based on analysis, the Chernobyl reactor was not equipped with an enclosed safety container, and its emergency water circulation system was neither complete nor perfect. Therefore, once the accident took place, radioactive gas soon spread to the atmosphere. More than 10 casualties have been reported to date in the disaster. No matter what the causes were, it was a bitter incident in the human history of nuclear power development. The unfortunate casualties among those nuclear power workers are heartbreaking. This disaster will serve as a grave lesson to people throughout the world.

Will the Soviet Union's Nuclear Accident Affect the Implementation of China's Plan for Nuclear Power Development?

This reporter asked: Will the Soviet Union nuclear accident affect the implementation of China's plan for nuclear power development?

Zhou Ping is an expert in nuclear reactor projects and is one of the chief responsible persons in the country's nuclear power industry. He smiled and said: "No. It will by no means change our determination to develop nuclear power." According to Zhou Ping, nuclear power is a new type of energy resource. It has already developed into an important resource of energy despite its short history of just over three decades. According to the statistics of one international atomic energy group, the total generated energy volume of nuclear power plants in 26 countries including the United States, France, the Soviet Union, Japan, the FRG, the United Kingdom, Canada, and Sweden accounted for 15 percent of the total world volume of generated energy by the end of 1985. It is estimated that by the year 2000, the volume of generated nuclear power energy will account for 40 percent of the total world volume of generated energy.

Insufficient energy supply in China has affected the national economic development, therefore the development of the nuclear power industry is a must. Such regions as East China, South China, and the Northeast, where there are great shortages of energy resources, especially need to develop nuclear power stations. Therefore, China's nuclear power industry, which is still in its initial stage, must be developed resolutely, step by step, with some focal points. This is China's set principle, which will not change just because of the Soviet Union's Chernobyl accident. By the year 2000, China's nuclear power industry will certainly have made great progress. Before making the important strategic decision to develop the nuclear power industry, China made overall and detailed investigations and studies, as well as analyses and comparisons of all types of nuclear reactors abroad. The final decision was to adopt the pressurized-water reactor, which is technically mature and has better safety quality. Moreover, from the very beginning China has persisted in cooperating with those countries possessing advanced technology, and in fully absorbing mature foreign experiences to ensure quality and safety.



Zhou Ping stresses: The basic purpose of China's peaceful use of atomic energy lies in benefiting the people with public safety above all else. In order to strengthen nuclear power station safety controls, of China founded its State Nuclear Safety Bureau in the initial stages of preparation for building nuclear power stations. It coordinated with the State Environmental Protection Bureau and the Ministry of Nuclear Industry in jointly drawing up and making complete and perfect nuclear power safety laws and regulations, in strengthening the safety examinations of the design of nuclear power projects, and in conducting the most strict supervision and examination of the building of nuclear power stations based on the laws and regulations, in order to ensure that every link and work procedure of design, building, installation, regulation, start-up and operations would conform to the requirements of the laws and regulations, and quality control. This was also done to ensure building good quality and safe nuclear power stations.

Is It Necessary To Worry About a Possible Accident at the Daya Bay Nuclear Power Station?

This reporter asked: Some people in Hong Kong have been very much worried about a similar accident at Guangdong's Daya Bay Nuclear Power Station which is under construction, since the Soviet Union's nuclear accident. Is such a possibility great? Is it necessary to have such worry?

Vice Minister Zhou Ping is concurrently on the board of directors of Guangdong Nuclear Power Development Company Limited, and a board member of the Daya Bay Nuclear Power Station Joint Corporation. He told this reporter that to those who do not understand nuclear power technology well, it is natural that they would have anxiety and worry. This is entirely understandable. It is the same for those who do not know the laws governing swimming and do not master the skill of swimming. They are always afraid that they will drown upon getting into the water. The practice over the past three decades and more has proved that mankind has entirely mastered the law and technology of generating nuclear power. People should not be overanxious about this.

Needless to say it is sometimes very difficult to forecast an accident. However, it has been 32 years since the Soviet Union built its first nuclear power station in 1954. Of the 374 nuclear power stations in various countries in the world, serious accidents have taken place only twice, in the United States and the Soviet Union respectively (although accidents also occurred in other nuclear reactors, they were minor and the incidence was low.) Through analyses of these two major accidents in nuclear power generation history, it is not difficult to arrive at a correct conclusion.

As mentioned above, the disaster resulting from the recent Soviet accident was obviously related to the lack of enclosed safety containing equipment. In March 1979, the U.S. Three Mile Island accident also caused a great shock for a time; however, it did not create the grave result of a radioactive material leak as did the recent Soviet Union accident. In the Three Mile Island accident, the people living within 80 kms of the nuclear power plant were exposed to an average 1 rem dose of radiation, which is only 0.5 percent

of the annual amount of natural radiation. The greatest dose of radiation to an individual was 100 rems, which is the same as a single medical x-ray treatment. In more than 100 samplings of air in the neighborhood of the nuclear power plant, the greatest density of radioactive iodine was only one-fourth of the permitted density for the inhabitants. No radioactive iodine was found in river water, soil, and plant samplings.

The U.S. Three Mile Island accident resulted from the loss of water because the safety valve was open and failed to return to its normal position. This led to a partial meltdown of the reactor fuel rods, and was forced to be shut. It was after all a grave accident. But why did it not create any danger to the public? The basic reason was that a rather safe pressurized-water reactor was used, with an entirely enclosed container which ensured no leakage of radioactive materials.

Today, Guangdong's Daya Bay Nuclear Power Station does not follow the safety standards of Three Mile Island Power Plant. It will follow far higher safety standards. The Daya Bay Nuclear Power Station is to adopt France's newly developed "Vanguard-type" safety valve. This has solved the problems of the aging or ineffectiveness of the spring in the old-type safety valve used by the Three Mile Island Power Plant. Moreover, all-round cooperation with France will be implemented in building the entire Daya Bay Nuclear Power Station, with all the major equipment made in France. Today, France's nuclear power volume accounts for 64.8 percent of the country's total volume of generated energy. At present, 44 nuclear stations are in operation in France, with another 17 under construction, most of which are of the pressurized-water type reactor, and which are located very close to inhabited areas.

Zhou Ping says that China takes France's safety standards as the minimum in building the Daya Bay Nuclear Power Station. It has adopted a design, which is the safest to date, which has three enclosed shields including a zirconium enclosure for nuclear fuel parts, a pressurized container, and a safety enclosure to ensure no radioactive leak gets into the atmosphere in case of an accident. In case the water injunction system in operation is out of order, another system will promptly and automatically inject water to prevent a meltdown if the supply of water is impeded. In case of a burst pipe, another water spraying system will go into action immediately to cool down the high-temperature steam spurting out from the pipe burst in order to prevent further damage to other parts of the installation. As for the power supply equipment, the station has adopted the principle of designing several stand-by systems. In case of an accident, the equipment will stop automatically and another system will automatically start to operate, so as to ensure enough power supply to recover control. A strict set of regulations has been stipulated concerning nuclear power station personnel. On the basis of strict selection of these personnel, the relevant state departments will send them to France for rigorous training, so that they may become skillful in operations and have the ability to handle any emergency. Then they will go through a strict national examination certifying them before they are allowed to work at the nuclear power station. Therefore, both Guangdong's Daya Bay Nuclear Power Station and the Zhejiang Qinshan Nuclear Power Station are built on a scientific basis and in entire conformity with the safety standards stipulated by the International Atomic Energy Authority. The problem of "being venture-some" does not exist.



9 July 1986

## PEOPLE'S REPUBLIC OF CHINA

## PAPER REPORTS NUCLEAR WASTE DUMPED IN HEBEI PROVINCE

Hong Kong SOUTH CHINA MORNING POST in English 24 May 86 p 1

[Text] Twenty-five tons of solid radioactive waste were dumped into a dry well in Hebei province in June 1985, sending radiation readings soaring to several hundred times their normal level, the CHINA DAILY reported yesterday.

The radioactive pollution threatened both surface and under ground water supplies before being cleared at an unspecified date, the paper said.

The report made no mention of illness from the pollution.

Two party and Government officials in Hebei had been dismissed from their posts for their role in the affair, the English-language daily said.

It quoted sources at the Beijing Nonferrous Metal Research Institute as saying radiation levels had returned to normal after the well was cleared.

The dried-up well was located along a river seven km from the Xidayang Reservoir. The report said there was a fault in the rock beneath the well.

The Communist Party organ, the PEOPLE'S DAILY, reported yesterday that radioactive clouds from the Soviet nuclear accident at Chernobyl last month had drifted over China in late April and early May.

Commenting on the CHINA DAILY report last night, the secretary of Hongkong Friends of the Earth, Ms Linda Siddal, said the incident appeared to have resulted from the "irresponsibility" of the sacked officials.

Ms Siddall said it was proof that any human error, mechanical failure or irresponsibility could prove dangerous in the use of nuclear substances.

Referring to the contamination of underground water by the radioactive material, she pointed out that some radioactive substances could take up to 300 years to decay underground.

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CSO: 5150/0120

BULGARIA

OFFICIALS EXPLAIN RADIATION LEVELS, SAFETY PRECAUTIONS

Sofia RABOTNICHESKO DELO in Bulgarian 8 May 86 p 2

[Interview conducted by Yavor Tsakov of Bulgarian Television with corresponding member Professor Lyubomir Shindarov, first deputy minister of national health and chief state medical inspector, and senior scientist engineer Ivan Pandev, president of the Committee for the Peaceful Use of Atomic Energy at the Council of Ministers, who responded to questions concerning radiation conditions in the country. Presented in slightly abbreviated form]

[Text] Following the announcement of the accident at the Chernobyl atomic power station, surveillance of radiation conditions in Bulgaria has been intensified, said Ivan Pandev. The systematic controls conducted so far show a reduction of the general radiation background and a trend toward normalization. For example, the six-hour summary today reveals that the radiation background is in the process of returning to normal. It is increased in only five okrugs, which is insignificant. Research has shown that, up to May 2 1986, radiation conditions in the country were normal, and we have already informed the public about this. On May 2, the movement of air masses from the north began. Toward the end of the day, we began to register an increase of the natural background of up to three times the natural background radiation in different parts of the country. We analyzed samples of air, rainwater, soil, open reservoirs, vegetation and milk, collected from the entire country. The results showed that, at isolated points and in a part of the samples, the content of some radioactive isotopes was increased, chiefly that of iodine 131. The concentration of the radioactive isotopes found in the air is lower than the admissible limits for the population.

How much lower?

Depending on the region, it can be 3, 5 or 10 times lower. The same applies to drinking water. In the next few days we expect the radioactivity in the country to be reduced, for two reasons: first -- due to a reduction in atmospheric deposits, and second -- because of the characteristic of radioactive isotopes to become less active with time. The major portion of radioactive isotopes found are short lived and lose half of their activity very rapidly; the activity of iodine-131 halves every 8 days, i.e. it takes

8 days to semi-disintegrate. This means that after 24 or 32 days it will be reduced by 8 to 16 times.

If we compare conditions in our country now with conditions at the time of the atomic explosions conducted at the beginning of the 60's, i.e. up until 1963 when the treaty banning the testing of atomic weapons in the atmosphere, on land and in water was signed, the data show that artificial aerosol radioactivity during the period 1954 to 1963 exceeded that currently contained in the air by approximately 1,000 times.

Radiation background in okrugs where there was an increase is now: Kurdzhali - 007 milliroentgens per hour; Gabrovo - 007 milliroentgens per hour; Stara Zagora - 006 milliroentgens per hour; Yambol - 007 milliroentgens per hour; Sliven - 006 milliroentgens per hour. The normal radiation background for the country is 0015, 0025 milliroentgens per hour. These data are within normal range.

To the question whether the increased radiation would be transferred from the atmosphere to the soil as a result of the rain that had fallen and whether it was necessary to take some steps to counteract this, Ivan Pandev replied:

Yes, of course, the rainfall carried part of the radioactivity from the atmosphere to the earth. However, only the topsoil is contaminated and, since the quantities are insignificant, it is not necessary to take steps to decontaminate the soil, i.e. to disinfect it.

For his part, Professor Lyubomir Shindarov indicated that there was no danger to health and [no need for] anxiety. We are receiving the most accurate information about the environment in which our population lives works and rests. I must emphasize, he said, that this concerns a slight increase in background only in isolated regions of the country. The degree of the increase, which characterizes the general radiation background, is insignificant and, from the medical point of view, it can be categorically stated that it does not pose a danger to health, neither to the health of children, even the smallest ones, nor mothers, nor pregnant women, nor active people, nor the elderly. We do not have a situation where people have been irradiated, and there is no danger to health from this slightly increased radiation background.

Nowhere in the country is the drinking water contaminated by radiation; it may be used in full safety for drinking and other daily uses. Milk poses quite a different question. Investigations of ewe's milk have shown increased radioactivity which is connected with contamination of the grass during the rainfall when the air mass swept over the country. The rain made its way, with the grass and the radioactive particles of food, to the milk glands and, from there, into the milk. I would say that this was detected in good time and we stopped the use of ewe's milk in good time. The ewe's milk is being processed into non-perishable goods, and will be stored until such time as the danger from its use has passed, but that will occur after the medical agencies have completed the necessary control. Cow's milk is totally safe to consume and we are no longer banning it. If radioactivity rises in it too, then we shall halt its use. And yet, I would like to remark that, as a

precaution, in some places we are recommending the use of dried milk. For example, in the okrugs of Sofia, Gabrovo, Vratsa and certain others. We are continuing to watch the situation with cow's milk most carefully, and we shall react most quickly if it becomes harmful, so that on no account will there be any danger to health from the consumption of this product.

With respect to fresh vegetables, I should like to emphasize that in certain regions now there is increased radiation contamination of leafy vegetables, such as lettuce, spinach and onions. In connection with this, I would like to explain that this concerns superficial contamination by radioactive particles stuck to the leaves and not contamination of sap absorbed from the soil. By abundantly and diligently washing the vegetables, one could reduce this radiation contamination to a considerable degree; nevertheless, given the present findings, we recommend that consumption of such leafy vegetables be limited for the time being. In their place, cucumbers, tomatoes and hothouse vegetables in general may be freely used without any danger to health since they are not contaminated by radiation.

With respect to fresh meat, recent investigations, conducted by the Scientific Institute of Radiology at the Medical Academy -- and these investigations were done on a large sample of animals located in those areas that were most affected and, moreover, a high-risk group of animals that had eaten grass -- I would like to say that their meat is totally safe. This goes for veal, mutton and lamb, which are herbivorous animals. I do not mention pork and poultry, which are not grass fed, and their meat is, on principle, totally safe to consume.

The extent of radiation and its transient character, with a pronounced trend toward normalization, did not give grounds for the health authorities to resort to iodine prophylaxis. I should like to point out that, even in the days before the first increase in radiation was determined in Bulgaria, the necessary quantities of iodine preparations were assured in all pharmacies and pharmacy warehouses, and we were fully prepared to proceed with iodine prophylaxis but the necessity for such a precaution did not arise. The accurate calculations made by our best specialists at our Institute of Radiology revealed that such minimum quantities of radioactive iodine -- that has the capacity to accumulate in the thyroid -- enter the human organism; and we repeatedly increased this, so to say, during the computations, and also for longer periods, in order to have a model of the extreme conditions which could emerge for the health, and the extreme danger, and I must say that, even in these conditions -- which could not arise, we are not dealing with quantities that call for iodine prophylaxis. Iodine prophylaxis was carried out in some European countries where the general radiation background and contamination of the external environment of food products was considerably higher. As far as other prophylactic measures of a more general nature are concerned, I would say that these concern maintaining personal hygiene. We are recommending, for example, that for a certain time and for the next few days small children avoid playing in open areas where there is a lot of dust and digging in sand and dust and that mothers wash the children's hands regularly and bathe them regularly.

Far more resources are put into atomic power stations to make sure that they operate reliably than are put into facilities of a similar nature, said Ivan Pandev later. We should point out that up to 50 percent of the capital investment for the construction of atomic power stations is tied to ensuring their reliability. All systems ensuring safe operation of atomic stations are supplied three ways, insured three-fold. These means that it is sufficient if only one of the three channels for each system goes into action for the functions safeguarding reliability and safety to operate. All that has been said up to now applies in full measure to our power station in Kozloduy.

With respect to the effect of the accident at Chernobyl on the development of atomic power here and throughout the world, I should like to make the following comment: atomic power is one of the greatest achievements of mankind during the second half of our century. At present there are more than 350 power reactors operating in the world. This branch of energetics is developing particularly rapidly in such countries as France, Sweden, Belgium, Japan, the Federal Republic of Germany, etc. For example, in France the share of energy produced by atomic power stations has already surpassed 60 percent. Atomic power prevails not only because of the limitations of other energy sources but also because of a number of advantages of an economic and ecological nature. For us, the use of power produced by the atomic power station at Kozloduy has replaced the excavation, transport and burning of hundreds of thousands of trucks of lignite each year, with all the ensuing consequences for the landscape and the population if this coal were burned in a thermoelectric power plant.

Irrespective of the event at the Chernobyl atomic power station, the program to construct atomic power stations will continue, in the West as in the socialist countries.

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CSO:5100/3041



GERMAN DEMOCRATIC REPUBLIC

NEW LAW TO PROTECT RADIOACTIVE MATERIALS WORKERS

West Berlin IWE TAGESDIENST in German No 80, 27 May 86 p 2

[Article datelined IWE Berlin 27 May 86: "Improved Radiation Care for Reactor Personnel in the GDR"]

[Text] In a directive dated 25 March 1986--about 5 weeks before the reactor accident at Chernobyl--the State Office for Nuclear Safety and Radiation Protection instituted improved radiation medicine treatment for persons exposed to radiation on the job. The directive takes effect on 1 July, and replaces corresponding regulations dating from 1970. It obliges workers at nuclear plants and radiation facilities, as well as in uranium mines, to submit to fitness and monitoring exams at minimum intervals of 1 to 4 years. The exams are "to take into account special work demands on those working with radioactive substances and on the support personnel, prior exposure to radiation, ...other harmful effects, and the exposures and dosages to be expected as a condition of the work." In the event of "extraordinary occurrences" of radiation dosage exceeding acceptable levels, special monitoring followup examinations are to be carried out. Publications about treatment labeled radiation medicine require the approval of the State Office for Nuclear Safety and Radiation Protection.

Ongoing, periodic treatment is supposed to provide timely care for illnesses and impairments to health, to prevent or limit complications, and to permit early recognition and treatment of long-term radiation damage. The continuing treatment program will include workers, in particular, who "have an accumulated effective dosage equivalent to more than 1 Sievert (= 100 Becquerels)," or who "repeatedly exceed the basic acceptable dosage for radiation exposure by a wide margin," as well as those persons suffering long-term aftereffects of work-related radiation accidents, or work-related illnesses resulting from exposure to ionizing radiation. Treatment of this group of persons is to be conducted by the radiation medicine specialist in the State Office. There are, in addition, radiation medicine specialists assigned to the industrial hygiene inspections in the GDR bezirks, which are tasked with conducting the periodic monitoring examinations.

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CSO: 5100/3043

INTER-AMERICAN AFFAIRS

YRIART ON IMPENDING ARGENTINE-BRAZILIAN NUCLEAR AGREEMENT

Buenos Aires AMBITO FINANCIERO in Spanish 12 May 86 p 13

[Article by Martin F. Yriart: "Historic Agreement Between Brazil and Argentina Revolutionizes International Politics]

[Text] During the entire decade of the 1970s Argentina and Brazil were constantly under the scrutiny of the superpowers, who were trying to see if there was a budding nuclear arms race between these two neighboring nations, which are traditional rivals in Latin America. The specter of an Argentine-Brazilian arms race was used malevolently in an attempt to impede their peaceful nuclear development. This was made easier by both countries' refusal to sign the Non-Proliferation Treaty or to accept the terms of the Tlatelolco Treaty, which they considered discriminatory. Now both nations are preparing to sign an agreement calling for the mutual inspection of their nuclear facilities. This will dispel once and for all any suspicion that either of the two may be building an atom bomb.

Argentina and Brazil are to sign an agreement providing for the mutual inspection of their nuclear facilities. This will put an end to international concerns about the possibility that either of the two nations may engage in an arms race to produce an atom bomb. The Brazilian nuclear physicist, Jose Goldemberg, president of the University of Sao Paulo and a member of the nuclear policy commission advising Brazil's President Jose Sarney, told AMBITO FINANCIERO this yesterday.

This announcement contains a real success for Argentina's nuclear diplomacy which has been working on this initiative for over 2 years. It is designed to free Argentina from its present position of relative isolation because of its refusal to sign the Non-Proliferation Treaty or to ratify the Tlatelolco Treaty. The reciprocal inspection agreement with Brazil would be open to signature by other nations of the region, thereby creating a real safety zone in the continent, which should effectively dissipate any fantasies about nuclear proliferation. It is believed that Mexico might be one of the first countries invited to join in signing this new accord.



Goldemberg stated yesterday that the Brazilian initiative is contained in the recommendations which the commission sent to President Sarney 2 weeks ago. He said he takes it for granted that the Brazilian chief executive will adopt the commission's recommendations, as they have the backing of two prestigious and influential Brazilian academic institutions, the Brazilian Physics Society and the Society for Scientific Progress.

"The agreement will make it possible to dispel mutual distrust between both countries," said the Brazilian physicist, who did admit, though, that there had been resistance to this initiative on the part of some political groups in Brazil. That opposition has now been overcome.

"There are people who think that Argentina is much more advanced in its nuclear development than Brazil, and that a close and unlimited cooperation agreement would be a sort of 'unequal marriage.' A match between a clay pot and an iron pot," said Goldemberg, using a common Brazilian expression. Nuclear specialists in Brazil, though, are quite well informed about the status of Argentina's nuclear development, added the scientist, and see nothing detrimental for Brazil in this new initiative.

The report sent to Sarney by the advisory commission includes a recommendation to rescale the nuclear plan and rearrange its schedule. According to Goldemberg, the commission recommended completing the two nuclear power plants currently under construction (Angra II and Angra III) and postponing a decision to begin new projects until 1989. "I believe those decisions should be made by the next administration," said Goldemberg.

According to the Brazilian physicist, Brazil would renegotiate its technology transfer agreements with the Federal Republic of Germany and also revise the makeup of the stock portfolios of the joint German-Brazilian enterprises handling power plant construction and the production of components, supplies, and nuclear fuel, over which the German partner now holds veto powers. In the opinion of some Brazilian political sectors, this diminishes Brazil's decision-making powers in this field.

The commission's recommendations reportedly include the liquidation of three enterprises set up under the German-Brazilian cooperation agreement: NUCLEP [Heavy Equipment, Inc], NUCLEI [Isotope Enrichment, Inc], and NUCLAM [Mining Assistance, Inc] (involved in the construction of nuclear power plants) and the privatization of NUCLEMON [Monazite and Associated Elements, Ltd] (which handles exploration and development of uranium deposits).

The commission also recommended creating a new agency under the office of the presidency, to monitor nuclear safety and radiological protection of atomic facilities, including power plants and research reactors.

## Cutback

The cutback in the Brazilian nuclear plan to only two power plants and the dissolution of industrial enterprises in this sector is an explicit recognition that the prospects of growth in Brazil's energy demand have changed substantially from what they were in the 1970s, when the ambitious plan for eight power plants was conceived.

The creation of an independent nuclear safety agency will place Brazil one step ahead of Argentina, where nuclear safety is handled by the same authority that builds and operates power plants. This has drawn criticism from groups concerned with environmental protection and population safety.

The creation of this new agreement which totally opens up the borders between Brazil and Argentina in the field of nuclear energy may be a decisive step toward a joint--or even subregional--development program that will significantly improve the efficiency of nuclear energy investments. This would lower the costs of electricity, making the economies of both countries more competitive.

The advisory commission's recommendations lead us to believe that Brazil is prepared to adopt the "Argentine model" for nuclear development. This model is based on the creation of its own independent capability in science and technology, not on technology imports, as Brazil's military regime had preferred to do.

This mutual inspection agreement may once again open up Argentina's doors to nuclear imports from countries such as Canada, which now refuse to export such materials to Argentina because of a fear of contributing to an arms race in the region.

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CSO: 5100/2076

BANGLADESH

OBSERVER: NUCLEAR TECHNOLOGY GROWTH PLAYING WITH FIRE

Dhaka THE BANGLADESH OBSERVER in English 19 May 86 p 5

[Editorial]

[Text]

The accident occurring at the Chernobyl nuclear plant in Russia has punctured the nuclear vaunt, built over half a century or so, it seems, more decisively than the Three-Mile Island mishap did—or could have done. With the picture of the after effects of the radiation leak at Chernobyl becoming clearer, after about 3 weeks, it should be possible to make a more accurate assessment of the short and long term damage of what could only be guessed at, earlier. The latest news, from the horse's mouth, (Dr. Gale, the US Bone Marrow Transplant expert flown to Chernobyl) is that about one lakh or more people would be affected by the radiation from Chernobyl plant. His reservation that no great numbers of people would die immediately from the effects of the radiation is small comfort. For the greater but insidious danger lies in the more than 1 lakh being in need of perpetual medical monitoring, to be treated for possible attacks of cancer or other lethal diseases. Atomic explosion and the radiation has been found to be responsible for cancer and similar killing diseases, in the long run, among those affected by it.

Incidentally, the 'catastrophe' at Chernobyl, happening behind the iron curtain, had nonetheless broken through the political barrier that keeps East and West far apart. Offers of expert help in the work of rescue and relief in all forms came unstinted from the West in Russia's great disaster. There is no extenuating the fact that the Chernobyl accident was openly and intrinsically the most shaking event of the world of the last fortnight. It has cut across political or diplomatic rivalries and set in train fresh thoughts about the latest and most expansive technology, offering not merely the bomb but opening up fresh

vistas of renewable energy supply, making for untrammelled economic growth.

The Chernobyl accident must have altered, in a significant way, such prospects of safe and uneventful utilisation of nuclear technology and energy for human development. People's confidence—as well as, by now, the self-assurance of experts—is bound to be shaken by the two events of Three-Mile Island and Chernobyl, plus other lesser accidents. The fact that experts, more than the layman, have to face up to is that he as well as his technology is fallible. Unlike the natural systems, such as the solar one, human systems can never be rendered proof against dangers, rising from either simple human error or the failure of technology. The space shuttle, Challenger, by the way, boasting the best of technical security measures also failed. (Subsequent discovery that the shuttle was flawed because of the rubber seal that failed does not alter the fact that technology was caught on the hop by the unforeseeable). So is the case with the high precision technology involved in designing and making aircraft—also with its average of disasters occurring either from human or technical failure.

The risk, borne out by actual incidents, would not however mean that 370 reactors now operating around the world should be closed down forthwith. Arguably, immunity and security measures could, in course of time, through trial and error, be improved enough, at least to bring down to a minimum the rate of disasters. So, merrily go on setting up nuclear plants to produce cheaper energy or the bomb. Against the shattering backdrop of Chernobyl, it should be curious to note that nuclear proliferation is going on not only between the super-powers. Even sub-or sub-sub-powers also are acquiring the technology—some for avowed peaceful purposes, some for making the bomb behind the facade of peace—and some doing the bomb openly. And in most of the cases some super-power or other encouraging and enabling the sub-power to do so.

But this is playing, literally, with fire, if Chernobyl is any experience to guide. Of course, there is no scrapping of the whole set of different technologies, because they will fail from time to time and cause human tragedies. Nevertheless, it is time perhaps to draw the line between the technologies, considering the magnitude of damage, actual and potential, and its relative proportion between them. This may be out of line with the humdrum no risk, no gain. But where, say, in a particular technology, the risk is far greater than

the gain, and if the risk is such that even peacetime technical failures can be so massively lethal—let alone a war—the question is if such a technology is at all acceptable. It is dreadful to contemplate that the risk of cancer and other complications from radiation involving tens of thousands of people may extend for 30 or more years. Rutherford's finding of the secret of the atom and the subsequent release of the genie of uncontrollable power may not have foreseen all these at its time.

/9274

CSO: 5150/0123

**BANGLADESH**

**BRIEFS**

**AEC ON CHERNOBYL**—Bangladesh Atomic Energy Commission in a statement on Thursday announced that Bangladesh environment remained free from pollution following recent nuclear disaster at Chernobyl Nuclear Power Plant in Soviet Union. The announcement was made following a meeting between the Atomic Energy Commission and senior medical doctors of nuclear medicine institute and centres. The health physicists of Bangladesh Atomic Energy Commission had been monitoring the local environment for the last ten days. [Text] [Dhaka THE BANGLADESH TIMES in English 16 May 86 p 1] /9274

CSO: 5150/0122



INDIA

**GANDHI RECEIVES PROPOSAL FOR NUCLEAR SAFETY PARLEY**

Madras THE HINDU in English 22 May 86 p 1

[Article by G. K. Reddy]

[Text] New Delhi, 21 May--The West German Chancellor, Dr Helmut Kohl, has proposed an international conference of high-ranking government representatives and those representing the relevant international organisations to consider ways and means of providing better protection to the world community from the hazards of nuclear accidents.

He has taken this initiative in the wake of the Chernobyl disaster which exposed the Soviet Union and other European countries to radiation.

The West German Ambassador to Delhi, Dr Guenther Schoedel, called on the Foreign Secretary, Mr A. P. Venkateswaran, to hand over a letter from Dr Kohl to the Prime Minister, Mr Rajiv Gandhi, who is one of the heads of government of the 33 countries operating or building nuclear power stations. The West German Government has offered to host this conference along with a preliminary meeting to settle the agenda for it.

He has envisaged the following three major objectives for this conference:

- (1) Creation of a mechanism for information which would guarantee an immediate and comprehensive exchange of information in case of a nuclear accident,
- (2) Elaboration of a set of principles with which international cooperation for coping with the consequences of nuclear accidents could be improved, and
- (3) Codification of internationally binding safety standards in order to reduce detrimental effects beyond national borders.

/9274

CSO: 5150/0113



INDIA

## NUCLEAR POWER BOARD CHAIRMAN INTERVIEWED ON SAFETY

Bombay THE TIMES OF INDIA in English 18 May 86 Supplement p 1

[Interview with Dr M. R. Srinivasan, chairman of the Nuclear Power Board of the Department of Atomic Energy, by S. Kumar]

### [Text]

Can you estimate the damage caused to the Chernobyl reactor from the details available?

It may not be a large-scale core meltdown. It is reasonable to think of limited fuel damage. If the pressure tubes ruptured, water and steam could have come into contact with the hot graphite. Steam disassociates into hydrogen and oxygen. Hydrogen mixes with carbon monoxide, causing an explosion. The graphite and fuel are in a stainless steel vessel in the RBMK type of reactors. The top of the reactor building is like any other industrial building.

In 1957, at the Windscale military facility in the UK, the graphite core caught fire during what was called the annealing process. But, in Chernobyl it was a different sort of fire. There was an explosion.

We feel that large reactors like Chernobyl should have secondary containment.

How do Indian reactors differ from the RBMK type?

Firstly, no Indian plant uses graphite as a moderator. Secondly, our reactors have secondary containment. These are the major differences.

Our reactors have additional safety features like the double containment envelope; filters in annular space between the double walls; a vapour suppression pool at the bottom of the primary container; air coolers for post-accident depressurisation and automatic bottling up of radioactivity through isolation valves.

In Tarapur, there is a dry well and a steel containment vessel connected with the vapour suppression pool to bring down the pressure in the reactor building. In Rajasthan, there is a dousing system and water spray system to bring the pressure inside below

the design pressure of the reactor building. We have adopted a more cautious approach in our siting policy ensuring low population density around the plant. We provide a one mile exclusion zone and upto three miles, no additional increase in population is allowed.

Our pressurised heavy water reactors have a relatively low power density which means the energy produced per unit volume of the core is low. This is an inherent advantage. More power density means more challenging safety engineering.

What lessons can be drawn from Chernobyl at present?

We have to wait for some time before we can learn any lessons from it. We will take note of safety aspects as we did in the case of TMI. There is no final word in technology. We learn continuously.

What is known as "probabilistic risk assessment" is becoming popular. If there are inadequacies, one has to engineer them. It may mean redesigning in some respects.

In the event of an accident necessitating evacuation of the public, are we equipped to face the challenge?

Off-site emergency plans for the Tarapur and Rajasthan plants have already been drawn up in consultation with the local authorities, health officials, civil defence, transport authorities and so on. These plans have already been approved by the safety review committee and the Atomic Energy Regulatory Board is now reviewing the plans. To ensure that the plan works, we will soon arrange emergency drills.

Referring to the Bhopal disaster, nuclear scientists commented that such an accident would never occur in a nuclear power

plant because nuclear technology followed the "fail safe system". Can you say now that such accidents will not occur in nuclear plants?

We designers never say it will not occur. To a large extent, we have succeeded in controlling the impact. Hence, there were no radiation-related deaths from a civilian power reactor. The concept of a "fail safe" system is still relevant. But greater care must be given to high technology.

While we express concern about a nuclear accident, general accidents do not attract our attention. We are totally indifferent to these general accidents. Human life is valuable in those cases too. It is not that concern is misplaced in nuclear-related accidents.

You may have full proof safe technology. What about human error? After all, it was indicted in TMI.

Because of our social structure, we in India deploy a larger number of university-educated engineers and scientists in these plants with sound training. This is an important factor contributing to safety. They are well-trained people with a good theoretical background. We will soon press into service simulators to assess the response of operating personnel to abnormal conditions in the plant. The TMI operator had limited training. The Europeans have begun to realise this.

Will you ensure safety at whatever cost?

All modern technology has to be used with a great deal of care to protect the environment and the general population. A good safety design need not be uneconomic or much too complex.

INDIA

CORRESPONDENT INTERVIEWS NUCLEAR POWER BOARD CHAIRMAN

Madras THE HINDU in English 23 May 86 p 8

[Text]

**T**HE accident last month at one of the reactors of the Chernobyl nuclear power plant in the Soviet Union has come as a rude shock to the nuclear power industry round the world. Nuclear engineers had maintained that an accident severe enough to damage a reactor core is likely only once in, say, 10,000 reactor years of operation. Yet in just 17 calendar years, the world has seen two serious accidents—at Three Mile Island in the United States in 1979 and now at Chernobyl.

The Chernobyl reactor was one of 12 units in the Soviet Union of a type known as RBMK-1000, that contribute roughly 60 per cent of the nation's nuclear power. It uses uranium dioxide as fuel, and stacks of graphite to moderate the chain reaction. The graphite stack is contained in a stainless steel vessel, which has an inert atmosphere of nitrogen and helium to prevent the oxidation of graphite. The reactor is cooled by water.

**Shocking failure**

Soviet engineers had taken pride in the RBMK's safety systems, saying that these were capable of eliminating any hazardous escape of radioactive material even in the case of unlikely accidents. Yet the safety systems failed shockingly.

What are the implications of this disaster for the Indian nuclear power programme? In an interview in Madras, Dr. M. R. Srinivasan, Chairman, Nuclear Power Board, explains that the reactors in India are of a different design, and therefore the mistakes of Chernobyl might not be entirely relevant. But he points out that studies would be made and if any valid lessons need to be learnt, and changes in Indian designs are called for, these would be carried out.

While listing some of the accidents that have taken place at nuclear power plants in India, Dr. Srinivasan makes it clear that at no time was there a situation that could have led to a 'melt-down' of the core.

"We haven't had a serious accident to date. No life has been lost in any of our installations attributable to radiation," he says.

**Loss of coolant**

Excerpts from the interview, which begins with an assessment of the Chernobyl accident.

**Dr. M. R. Srinivasan:** The Chernobyl accident is the most serious nuclear accident till date. We do not have many details yet on the sequence of events, but one can reconstruct possible scenarios. It is likely that there was a loss of coolant from some part of the core due to which steam and water would have come into contact with hot graphite. Normally the graphite is at a temperature of 500°C, and it is well known that when hot graphite comes into contact with steam or water, hydrogen is liberated. The Soviet press has reported an explosion that seems to have taken place. So it seems likely that the initial explosion would have taken place because of rapid hydrogen formation. It is also likely that the protective atmosphere around the graphite would have been lost and the graphite could also have ignited. It is not easy to use water to quench a graphite fire, as this would liberate more hydrogen. And therefore helicopters were used to drop bags of boron, lead and sand to put out the fire.

None of our reactors use graphite. So a graphite-related fire is not relevant in our context. Secondly, the reactor at Chernobyl is encased in an industrial type of building—structural columns with cladding. The reactor core itself is in a concrete pit, where the thickness of the concrete makes it a radiation shield. But the top of the reactor is similar to a normal industrial structure.

**Different design**

This is a different design from what we use at our reactors. At the Madras Atomic Power Station in Kalpakkam, the pre-stressed concrete reactor building is designed to withstand the maximum possible pressure that can be generated in the event of the

worst accident. It has been tested to withstand 13.5 pounds a sq. inch of positive pressure, and the maximum pressure that would build up if the safety systems work as they should is about 7.7 pounds a sq. inch. Even if the safety systems were to fail, the maximum pressure that can be reached is 10.7 pounds a sq. inch.

The "maximum credible accident" we have considered is a double-ended failure of a 10-inch heavy water header, the largest diameter heavy water line that goes into the reactor. If such a pipeline were to break, then quite a lot of coolant would be lost, heating up the fuel and causing a release of energy in the form of hot steam and water. That energy would go into the containment building and build up pressure within it. The device to release pressure in such a situation is the large pool of water in the basement of the reactor building. At Kalpakkam the pressure suppression pool contains some 2,300 tonnes of water. We have also looked at another extreme scenario. Suppose there is a complete reaction of the zirconium fuel cladding with water, the temperature of the water in the suppression pool would rise by only about 20°C even if the other mechanisms of cooling do not work.

When we evolved our containment philosophy for Kalpakkam, we tried to utilise the principles that had been used partly at Tarapur and partly at RAPS (Rajasthan Atomic Power Station). We adopted a partial double containment at Kalpakkam. We have gone a step further to a double containment at the Narora Atomic Power Station.

Another point to bear in mind is that in a heavy water reactor, if the heavy water is lost there is no possibility of any neutronic reaction. Heavy water being the moderating material, the uranium fuel cannot sustain a nuclear chain reaction without it. Without heavy water, at worst there will be local heating. Once the chain reaction stops, the neutron population in the reactor dwindles and the fission process does not take place.

#### **If power supply fails**

**Q:** You expect the power supply to fail in such accidents. So how would the safety mechanisms activate?

**MRS:** The essential safety related systems depend on power supply from diesel generators on site. We have two diesel generators for each reactor, and one is adequate to keep the safety systems supplied with energy. Now at Kalpakkam we are putting a third diesel generator—this was a decision taken some time ago—which can be used with either of the two reactors.

**Q:** In the event of a fire, even the cables from the diesel generators to the safety mechanisms might be destroyed...

**MRS:** It is for this reason that the cables are routed through different paths. I am glad you raised the question of a cable fire situa-

tion for we had a fire in RAPS-II some months ago inside the reactor building. There was a fire in a cable that was going to one of the main reactor coolant pump motors, but we were able to contain the fire. The consequences of the fire were economic. There was an outage, but there was no radioactivity dispersal. Subsequently, an analysis was carried out and some lessons were learnt. Any major reactor incident always throws up lessons that should be learnt. It is like the aircraft industry. Whenever there are crashes not attributable to bombs, there are objective lessons learnt that are later incorporated into the design.

#### **New safety features**

**Q:** In the light of the accident at Chernobyl, are you thinking of building new safety features at our reactors?

**MRS:** We constantly analyse accidents that can possibly take place such as moderator-heat exchanger tube failure, steam generator tube leak, large loss of coolant. The scenario is built up, and then we write out the procedure to contend with such situations. What is to be done is then prescribed and given to the operating staff. This type of analysis goes on all the time.

The nuclear industry right from its inception has grown with an awareness of the risks involved. Right from the days when the first reactors were being designed, various types of possible failures were examined and the designs checked to satisfy that under all the failure conditions there would be no serious risk to the personnel working at the plant, to the equipment and the general public. This tradition has been maintained and formalised over a period of time.

In this sense, nuclear technology is different from chemical plant technology. I'm not sure that a similar formalised system of accident analysis, analysis of upset conditions, and the impact on plant personnel and the public is carried out.

Although the Chernobyl accident is a bad one, it is my view that the nuclear reactor technology will gain the appropriate lessons from this and the industry will be made safer.

When the Three Mile Island accident took place we had study groups that looked at the lessons to be learnt, and a number of design modifications have been made since.

While it is true that Chernobyl is a different type of reactor and some of the lessons may not be directly applicable to our plants, we will follow whatever information is available and see if any lessons can be learnt. If we find that changes have to be made or new safety features added, we will certainly make them.

#### **Mishaps in Indian plants**

**Q:** Have there been accidents at any of our plants that did come to a 'core melt-down' situation?

**MRS:** We have not had that kind of accident so far. I can tell you the kind of ac-

cidents we have had to contend with. We had at RAPS the spurious actuation of the dousing system. In the event of an accident and a large release of energy into the containment building, the safety system at RAPS activates and empties a large tank of ordinary water stored at the top of the reactor. The water which is discharged quickly through large valves condenses any steam or water vapour in the reactor and thereby absorbs the energy release. We had a situation when without any real reason, the dousing took place. We later found out that the sensing equipment had picked up a false alarm. With many motors and equipment flooded in water and in need of rehabilitation, we lost the output of the unit for two months. Then we had this fire, also at RAPS, which cut off power supply to the pumps. The fact that something was abnormal was soon evident to the operators and the unit was shut down. There was no loss of coolant because the other pumps were working and we were able to bring the unit down to a safe condition.

So in our many years of operation, we have not really had a situation of the kind that could have led to a 'core melt-down'.

**Q:** What is the closest that you have got to such a situation?

**MRS:** There was one incident in Tarapur in 1974, when a very stupid mistake by one of the electrical linemen resulted in the cutting off of the power line to both the units. At that time the switchyard was under the control of the Maharashtra State Electricity Board and the lineman was instructed by MSEB to earth a particular section of the bus. By mistake he earthed the live bus and cut the power lines to the two reactors. But the various safety systems all activated and the operating engineers, also realising that an accident had taken place, took steps to ensure that the reactor safety was not jeopardised.

Because the Indian atomic programme is not large, we have been able to deploy a number of qualified engineers at our reactor installations. At any given time in a shift, there are a number of graduate engineers and these people are not just operators in the sense that they only close valves or open them or just follow instructions. They can also do some analysis on their own.

When the Three Mile Island accident took place in 1979, the enquiry commission concluded that there ought to be qualified engineers at reactor installations at all times—engineers who could understand and deal with any abnormal situation. It is quite likely that in the United States, the cost of having highly qualified engineers round the clock might have been a deterrent. Or maybe they do not have enough engineers relative to the size of the programme.

#### **Fuel failures**

**Q:** Has there been any release of radioactivity from our reactors?

**MRS:** We have had fuel failures; by failure

we mean that the sheath of the fuel ruptures and the radioactive material leaks into the cooling water. An increase in the iodine level is a sign of such leaks. Such increases in the iodine level have been measured at both RAPS and Kalpakkam. Even though these levels can be measured, they are not serious and what happens then is we remove these faulty or failed fuel rods using the remotely controlled fuelling machines. Radioactive material has never leaked out into the environment because of the good containment. In the case of Tarapur also we have had some cases of failed fuel, but because of the off-gas system, where activated charcoal absorbs any iodine, there has been no concern about iodine levels outside the plant.

**Q:** During the Chernobyl fire, helicopters dropped loads of sand, boron and lead on the reactor. Do we have the infrastructure and the facilities to fight a nuclear fire?

**MRS:** Well, I'm quite certain that even in the Soviet Union, all the helicopters would have come from the defence forces. It is not as though we do not have helicopters. A nuclear accident of this kind is comparable to floods, earthquakes or some such disaster, and in India disaster management is beginning to be recognised as something that has to be done. I do not expect this kind of accident with the kind of reactors we have, because the designs are different. Nevertheless we should have the capability for disaster management. For example, we had a fire in one of the Bombay High oil wells. One had to mobilise the appropriate response then. That fire did not mean that we should not have offshore oil exploration. We have also had some onshore fires. It only means that we should develop the capability for disaster management.

**Q:** Are any special efforts being taken in this direction?

**MRS:** We have various emergency drills in the power stations. We have also prepared procedures for off-site emergencies involving interaction with the civilian authorities such as the police. We will now examine whether we should have some drills that involve the neighbouring community. Because it is good to be prepared. One must take these drills seriously and get accustomed to the fact that modern living involves certain risks and one should be prepared to face these risks.

#### **Probabilistic analysis**

**Q:** How safe are our reactors? Could you put a figure on the risk factor?

**MRS:** There is a new branch of analysis called probabilistic analysis. One defines the probability of a reactor accident in terms of one accident in 10,000 reactor years or so. We have logged about 40 reactor years—Tarapur about 32 years and the others about 10. We haven't had a serious accident till date. No life has been lost in any of our installations attributable to radiation.



INDIA

# KOHL SUGGESTION CALLED INTERFERENCE WITH SOVEREIGNTY

New Delhi PATRIOT in English 24 May 86 p 4

[Editorial]

[Text]

West German Chancellor Helmut Kohl's letter to Prime Minister Rajiv Gandhi appears innocuous and guided by high moral principles but it is actually part of the continuing effort to circumscribe freedom to utilise the frontier technologies for development by emerging societies. There can be no quarrel with his suggestion that there should be adequate safety measures in the pursuit of peaceful uses of nuclear energy but given West Germany's unseemly scramble to climb the Star Wars technological bandwagon in utter disregard for the gargantuan disasters it makes possible, there is need for India to be wary of the West German initiative. The sudden yen for failsafe safety is the fallout of the Chernobyl disaster in the Soviet Union which the West has milked for all its political and economic value. Bonn has apparently been assigned the task, in the normal division of labour among the NATO military alliance, to turn the attention of its own sizable anti-nuclear movement and that in Europe and the US away from demolishing nuclear weapons stockpiles to the innocuity of safety measures in the peaceful uses of the atom.

By calling for internationally binding safety standards in order to reduce detrimental effects beyond national borders Mr Kohl has adroitly sought to draw a screen across the more disastrous possibilities that the Star Wars programme opens up for mankind. For one thing it makes "limited nuclear wars" possible and Mr Kohl in his communication to Prime Minister Rajiv Gandhi has failed to express any fears about the fallout and radiation such tactical nuclear weapons will unleash on significantly large segments of the world population. And what of concern "beyond national borders" then? Besides, as always, the main thrust of safeguards



and safety of the nuclear "haves" has been directed at commercial nuclear enterprises on which sizable portions of the developmental strategies of the emerging nations have been invested and the Kohl proposal is the forerunner of on-site inspection for verification of adherence to the code of safety thereby achieving what could not be done through the infamous nuclear Non-Proliferation Treaty (NPT) — fullscope safeguards to ensure that there is no diversion of nuclear fuel to military purposes. "Fullscope safeguard" was itself perceived by developing nations like India to be a thinly disguised manoeuvre to circumscribe sovereignty and to control the national nuclear energy programmes of the member-states of the International Atomic Energy Agency.

India has done well to put on record at the meeting of the IAEA Governors that that proposed safety measures must also apply to military facilities. If anything the Kohl initiative must be utilised to push for an end to nuclear arsenals and failsafe methods for the peaceful uses of the atom.

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CSO: 5150/0115

INDIA

# CALAMITIES MANAGEMENT OFFICE TO DEAL WITH NUCLEAR SAFETY

New Delhi PATRIOT in English 27 May 86 p 5

[Text]

Authorities are considering enlarging the scope of the proposed National Bureau for Management of Natural Calamities (NBMNC) to cover nuclear safety and emergencies, reports UNI.

This is being considered in the light of the recent accident at the Chernobyl nuclear power plant in the Soviet Union.

Though the possibilities of a Chernobyl type of accident is ruled out in the Indian nuclear power plants, the authorities want to strengthen the preparedness for any emergencies in view of India's ambitious nuclear power programmes.

A committee to study the implications of the Chernobyl acci-

dent is also being considered by the Government.

Officials sources said the Department of Atomic Energy (DAE) constantly analyses the possibility of accidents in India power plants, particularly in vulnerable areas of moderator-heat exchanger and steam generator.

Accidental burning of graphite stacks as in Chernobyl is unlikely here, as all Indian nuclear plants use heavy water as moderator.

The DAE had even set up a study group to draw lessons from the 1983 three-mile island nuclear accident in the United States.

While planning to entrust nuclear emergency operations to NBMNC, it is envisaged to make the bureau the nodal point for coordinating all relevant agencies, including the Defence forces, in meeting any emergency.

The NBMNC was originally intended to deal with natural calamities like cyclones, droughts and floods. But experiences like the massive fire in Bombay High offshore oil platform and several fires in high-rise buildings have highlighted the need for a national level coordinating agency for such emergencies.

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CSO: 5150/0116

INDIA

BRIEFS

**FRENCH UNIT COMPONENTS**—Paris, 19 May (PTI)—Some vital components for India's nuclear power plants are to be supplied by the French company C3F (Companie Francaise de Forge et Fonderies), according to a company spokesman. He said the Indian order is for components for the primary circuits of the atomic power plants. The components include pumps, valves, nozzles, casings, turbine rotors and engine components plus the non-magnetic rings of turbine generators. The company's plant in Pamiers near Toulouse is the only unit in Europe capable of forgings steels, titanium, aluminium alloys and super alloys using a technique called 'closed-die forging' which guarantees the safety norms required by the nuclear and aeronautics market, he said. The Indian order is apparently for the power reactors to be built in Karnataka and at Kakrapar in Gujarat. [Text] [Bombay THE TIMES OF INDIA in English 20 May 86 p 16] /9274

CSO: 5150/0117

IRAQ

BRIEFS

NUCLEAR ENERGY MEETING IN BAGHDAD--Baghdad (QNA)--The scientific conference on the use of nuclear energy for peaceful purposes, which is being organized by the federation of Arab physicists and mathematicians in cooperation with the Iraqi Physics Society, began its meetings here yesterday. The conference, in which 200 specialists in nuclear energy and its peaceful applications participate and which will last one week, will discuss studies on the [Iraqi] 17 July reactor and shed light on the incident of the Soviet Chernobyl reactor and industrial and medical applications of radiation. [Text] [Amman SAWT AL-SHA'B in Arabic 15 Jun 86 p 22 JN] /6091

CSO: 5100/4515

NIGER

BRIEFS

URANIUM PRODUCTION TO CONTINUE—Niamey, 22 May (AFP)--Uranium production in Niger is to continue, the managing directors of uranium exploiting companies assured yesterday. The managing directors of the Akouta Mining Company (COMINAK), the Air Mining Company (SOMAIR), and the General Nuclear Materials Company (COGEMA), who came to brief President Seyni Kountche on the outcome of the COMINAK and SOMAIR boards of governors meeting, stated that "despite the difficulties caused by the crisis" the accounts of the 1985 exercise were approved, and the companies ended the year "under acceptable conditions."  
[Text] [Paris AFP in French 2100 GMT 22 May 86 AB] /9274

CSO: 5100/33



SOUTH AFRICA

REPORT SAYS COUNTRY MAY HAVE SEVERAL NUCLEAR BOMBS

Johannesburg THE STAR in English 31 May 86 p 6

[Text] London--South Africa has the capability to produce nuclear weapons and may have "several bombs in its cellar," according to a report released at a conference on the arms embargo.

But, the report says, secrecy surrounding nuclear relations generally has kept the truth concealed.

Reopening the debate on blasts recorded in Southern Africa in 1979 and 1980 and purported to have been caused by nuclear explosions, Mr Abdul Minty, director of the World Campaign Against Military and Nuclear Collaboration with South Africa, says: "There is no longer any doubt about South Africa's nuclear weapon capability. What is not known is the number of devices it has in stock and the precise nature of the weapons.

"Most of the aircraft in the South African Air Force can easily deliver nuclear weapons and, in addition, it has both ground-to-ground and air-to-ground missiles. There have even been reports that it is working on the deployment of cruise missiles."

He says: "Although South Africa may by now have several bombs in its cellar, it is still highly dependent on external sources of know-how, plant, technology and finance in order to proceed with its ambitious nuclear plan."

At the same time the Anti-Apartheid Movement (AAM) told the conference three British companies were marketing South African-made military equipment in breach of Britain's pledge to uphold Commonwealth, UN and EEC bans on military co-operation with Pretoria.

The AAM says the latest edition of the authoritative Jane's Military Communications contains evidence of the "continuing collaboration" of British companies in the "South African military-industrial complex."

In all three cases the products are military communications equipment.

An Armscor spokesman said: "We do not comment on the sales or purchases of military equipment."

/9317  
CSO: 5100/35

SOUTH AFRICA

GRAND PLAN TO DEVELOP NUCLEAR POWER

Johannesburg THE STAR in English 12 Jun 86 p 16

[Article by Sue Leeman]

[Text]

South Africa should be planning to launch a major nuclear programme by the turn of the century, when a second nuclear power station in the Western Cape will become viable, according to the executive chairman of the Atomic Energy Corporation, Dr J W L de Villiers.

Addressing delegates at a conference on South Africa's future energy needs in Pretoria this week, he sketched an ambitious scenario involving expenditure of R250 000 million between the years 2000 and 2035, and the switch-on of the country's first breeder reactor by the year 2025.

Dr de Villiers said South Africa did not have adequate energy reserves and would have to look for alternatives.

REQUIREMENTS FOR ELECTRICITY

At first glance the country's coal reserves looked set to last for another 300 years. "However, this is a fallacious assumption for, if a growth rate of 5 percent in electricity consumption is assumed for the next five decades, it can be shown that our total extractable coal reserves would be committed to electricity production alone by the year 2035."

Dr de Villiers said the country's uranium reserves, if used in the present thermal reactors of the Koeberg type, were equivalent only to some 15 000 million tons of coal, and thus could postpone for only a few years the date when all reserves were committed to electricity generation.

"However, if used in fast breeder reactors, our uranium reserves will be equivalent to some 900 000 million tons of coal, allowing enough time for the development of new energy systems such as fusion, or perhaps alternative renewable resources which could also be used for electricity production."

Dr de Villiers said it was important to time the development of the country's nuclear programme so that available uranium resources were used to the maximum.

"A delay in initiating a local nuclear industry will strain local coal reserves and eventually

precipitate a too rapid transition from coal to nuclear power."

Dr de Villiers charted his programme for the industry, saying it could be launched in the year 2000. No more coal stations would be built after 2000.

POLLUTION

"Initially, nuclear reactors will become economic at coastal areas far removed from cheap sources of coal in the Eastern Transvaal.

"As coal becomes scarcer and more expensive, and as pollution and water supply become more problematic, nuclear power will become more attractive.

"Studies have shown that a second nuclear power station will become viable in the Western Cape by the year 2000."

Because local uranium would be limited, he added, nuclear generation would have to be by way of breeder reactors.

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SOUTH AFRICA

REVIEW OF NUCLEAR PROGRAM URGED

Johannesburg THE CITIZEN in English 7 Jun 86 p 4

[Text]

HOUSE OF ASSEMBLY. — It was time for a thorough review of South Africa's nuclear energy programme and of the Koeberg power plant near Cape Town in particular, said Mr Roger Hulley (PFP, Constantia).

He called for an independent commission to investigate and assess the risk of a nuclear accident at Koeberg.

Most of the rest of the world was reported to have placed their nuclear expansion programmes on ice, "but this Government seems to have reacted as though no particularly noteworthy steps need to be taken here in South Africa.

Another pressing concern was its cost and "straightforward value for the tax-payer's money.

In the 1981/82 financial year, 63 percent of the department's budget, or R250 million had been allocated to the uranium enrichment programme.

For the current financial year, R755-m was being budgeted for the Atomic Energy Corporation, which was now 89 pc of the department's budget.

This figure was many times more than that spent on Black housing and more than twice than the entire amount allocated for housing this year, Mr Hulley said.

Another issue was that the deterioration in South Africa's political situation had to have had an effect on the country's ability to fuel Koeberg and keep it safe, as well as run it at a cost that was reasonable.

Last year, President Ronald Reagan's executive order on relations with South Africa banned US goods and technology exports.

Also last year, the United Nations General Assembly had urged members to adopt a range of sanctions against South Africa which included the prohibition of all new nuclear contracts.

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SOUTH AFRICA

KOEBERG COMPARED TO CHERNOBYL

Johannesburg FINANCIAL MAIL in English 9 May 86 p 53

[Text] The disaster at Chernobyl has prompted questions about the safety of SA's Koeberg nuclear power station. However, explains an Escom spokesman, where Chernobyl uses a graphite moderated reactor, Koeberg's is moderated by water.

This is an important difference. Water does not burn, graphite does. The fire at Chernobyl is commonly thought to have occurred when the fuel rods which run through the graphite overheated and set it alight.

Because Koeberg is a pressurised water reactor, a similar accident is impossible. The spokesman also says that safety precautions built into Koeberg are far greater. "The industry learnt a lot from Three Mile Island, he says.

Koeberg's fuel (97% U238 and 3% U235) is contained in ceramic pellets sealed in zirconium tubes within the reactor vessel of 20 cm stainless steel. All this nestles in a 2 m thick reinforced concrete "biological shield" and an outer containment shield of 1 m reinforced concrete.

This all sits in an airtight containment building made of 1 m thick steel-lined poststressed concrete.

The containment system is to prevent leakage of material and radioactivity should the worst happen. Before a meltdown can occur at Koeberg, a number of safety systems would have to fail. "In the event of a loss of coolant accident (loca) there are a number of back-up systems."

The biggest problem in this event would be stopping the reaction before it overheated, resulting in a meltdown. Water which contains boron to absorb neutrons would automatically flood the reactor vessel in the event of a loca.

Another design fault at Chernobyl is said to be that the control rods which absorb neutrons and slow down the reaction have to be mechanically inserted. Koeberg's control rods are introduced into the reactor from the top. They are held by magnetic clips which would automatically drop the rods into the reactor if problems were to arise.

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SOUTH AFRICA

CRACKS IN KOEBERG NOT SIGNIFICANT SAYS MINISTER

Johannesburg THE CITIZEN in English 28 May 86 p 4

[Text]

HOUSE OF ASSEMBLY. — The desirability of changes to the design and operation of Koeberg and the Koeberg emergency plan would be considered when the causes and sequence of events at Chernobyl had become sufficiently clear. The Minister of Mineral and Energy Affairs, Mr Danie Steyn, said yesterday.

Replying to questions by Mr Roger Hulley (PFP Constantia), he also said that a number of cracks had appeared in the foundations and containment of Koeberg during and after its erection.

Since these cracks were "all associated with the setting of the concrete during construction" no steps to prevent recurrence were necessary.

Mr Steyn said Koeberg's design was "en-

tirely different" to that of Chernobyl.

Moreover, Escom had an emergency plan, based on the American model, which was as extensive as any other in the world.

Escom was however monitoring the events at and around Chernobyl closely.

"In order to provide further for absolute safety, thorough inspection and test programmes are conducted when the plant is shut down for reloading."

No cracks had appeared in the foundations or containment of Koeberg since the first reactor came into operation.

"Minute cracks however appeared in the lower raft foundation during and immediately after construction as a result of shrinking of the concrete in the normal process of setting.

"In addition, a vertical construction joint in the

retaining wall leaked ground water into the foundation area.

"Cracks of this type may occur in major reinforced concrete structures and are provided for in civil engineering design codes.

"Similarly, hairline cracks appeared in the concrete of the containment building. These cracks had no structural significance.

"The leak-tightness of the building is not affected since the inner surface of the containment building is formed by a leak-tight steel shell and the concrete ensures the mechanical strength."

The cracks in the lower raft foundation and retaining wall had been sealed. No action was necessary on the hairline cracks in the containment building.

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SOUTH AFRICA

STEYN PRAISES KOEBERG EMERGENCY PLAN

Johannesburg THE CITIZEN in English 7 Jun 86 p 4

[Text]

**HOUSE OF ASSEMBLY.** — The possibility of a radiation problem at the Koeberg nuclear power station could not be ruled out, the Minister of Mineral and Energy Affairs, Mr Danie Steyn, said.

However he believed everything humanly possible had been done to ensure that the emergency plan for the station was the best possible, he said during debate on his Budget Vote.

"With all the facts that I have about our emergency plan, I can say with a clear conscience that it has been well done."

**MOH rapped**

Mr Steyn said statements by Cape Town's Medical Officer of Health, Dr Reg Coogan, that the emergency plan was ineffective created the wrong impression and should not have been made.

Dr Coogan was an officer on the emergency

control centre at the Cape Town Civic Centre and as such should work from within the system to bring about changes to the emergency plan if he was dissatisfied with it.

By making statements, he was "shooting down his own city council".

**Best possible**

Mr Steyn said that while he was confident about the safety of Koeberg "we must not sit back on our laurels and say we can't have a problem".

"We must do everything to ensure that if it does happen, we have the best possible emergency plan."

As far as the technical security aspect regarding radiation problems at the plant was concerned, he said, "we are prepared with all the information at our command".

There were two safety boards staffed by experts to ensure that safety was maintained "as far as possible" and he did not believe there was a need

for an independent investigation of safety measures.

**Involvement**

Mr Steyn said the emergency plan in the event of a radiation leak was "intensive" and involved the Cape Town City Council, the Divisional Council, local authorities in the area, the SADF, Metro rescue services and other bodies.

"There is not a body that is not involved," he said.

Emergency control officials manned a fully-equipped centre at Koeberg and there were also control centres at the divisional Council and the city council.

Mr Steyn also said that the Government would "look very carefully" at population densities when planning future nuclear power stations.

"We will definitely look at that very carefully in future when we have to take such a decision."

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SOUTH AFRICA

HEALTH REPORT CRITICIZES KOEBERG MEASURES

East London DAILY DISPATCH in English 3 Jun 86 p 9

[Text]

CAPE TOWN — Emergency measures in case of an accident at Koeberg were "highly unsatisfactory", Cape Town's Medical Officer of Health, Dr Reg Coogan, said in his health report summary before the amenities and health committee yesterday.

The committee agreed that the matter should be put to the executive committee with a view to approaching the Nuclear Safety Council, a public watchdog body.

Accumulated evidence of the nuclear health hazards to Cape Town's citizens would be placed before them. The evidence includes a study in which a trace element was blown by wind from Koeberg to Green Point, Paarden Eiland and Milnerton.

Other evidence includes advice from nuclear regulatory authorities in the US and Europe that "we need a very viable emergency programme which

should be exercised regularly".

In his report, Dr Coogan outlined two major "difficulties" with existing measures.

One was that Cape Town Civil Defence had never been called on to "exercise its capability to reduce casualties in the case of a major release from Koeberg".

"This is despite a number of exercises held before and during the operation of the station and a number of pleas by me."

Dr Coogan said Escom's contention that no significant radio-active contamination would reach Cape Town had been rendered "untenable" by an exercise in November last year, and "ridiculous" by the consequences of the accident at Chernobyl.

The accident exercise in November was held with a postulated westerly wind, and shel-

tering was considered necessary almost as far as Paarl.

Had the wind been northerly, a large part of Cape Town would have had to be ordered to shelter in the case of a real accident, Dr Coogan said.

Another "difficulty" was that an "unknown nuclear engineer at Escom" on duty at the time was responsible for ordering the emergency measures to be taken to protect the lives of one-and-a-half million people, he said.

At the same time, this engineer would be trying to control a nuclear accident in his own power station.

"Apart from the obvious conflict of interests which must arise, such a farcical arrangement would not be countenanced by any of the nuclear regulatory authorities which council officials visited overseas."

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SOUTH AFRICA

# KOEBERG SAFETY PLANS TERMED 'ADVANCED'

Johannesburg THE CITIZEN in English 4 Jun 86 p 4

[Text]

CAPE TOWN. — Escom has hit back at an accusation this week that its safety arrangements at the Koeberg nuclear power station are "farcical".

A report submitted to the Cape Town City Council's Amenities and Health Committee, by the Medical Officer of Health, Dr Reg Coogan, said Escom's claim that no significant radioactive contamination could reach Cape Town had been "rendered ridiculous" by the consequences of the Chernobyl nuclear disaster.

However, a statement issued yesterday by Escom said it was "unrealistic" to consider the adequacy of the Koeberg emergency plan in the light of the Chernobyl accident.

Escom's divisional manager (Nuclear), Mr P

M Semark, said an accident such as had happened at Chernobyl was "impossible at Koeberg".

But, even should such a serious accident occur at Koeberg, the effects would be minimised due to the physical barriers between radioactive material and the atmosphere. These barriers had not existed at Chernobyl, he said.

He said Koeberg's emergency plans were "among the most advanced in the world", and were based largely on American practice.

Mr Semark said detailed plans, administered by the Cape Divisional Council, existed for an area of up to 16 km from the station.

"Beyond the 16 km, these plans are simply extended to whatever area may be affected," he said.

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SOUTH AFRICA

## IMPACT OF NUCLEAR COOPERATION SHUTDOWN VIEWED

Johannesburg BUSINESS DAY in English 23 May 86 p 7

[Article by Hamish McIndoe]

[Text]

INITIAL Soviet silence over its stricken Chernobyl nuclear reactor caused a storm of protest in the West. The disaster underlined the need for the highest safety standards in the nuclear power industry — everywhere.

But nuclear sanctions by Western powers against SA have raised fears that difficulties might be encountered in securing export licences and technology transfers for vital safety equipment.

SA's eclipsing nuclear relations with the West is coursed by former SA ambassador to the US, Donald Sole, in the latest bulletin of the Rand Afrikaans University's Institute for American Studies.

The shutdown of nuclear co-operation with the US, Britain and West Germany is virtually complete after about 30 years of "enthusiastic collaboration".

While the freeze towards SA began in the 1970s, recent US legislation has virtually terminated co-operation in this field.

Last October, President Ronald Reagan's Executive Order on Relations with SA (EORSA) banned US goods and technology exports used in the nuclear field.

Access to International Atomic Energy Agency (IAEA) safeguards to reduce nuclear proliferation risks and preserve safety standards are still assured, the EORSA stressed.

But Sole believes that in the current political climate "problems may

even be expected" in securing US export licences for such equipment.

Four months before the EORSA, the UN General Assembly urged members to adopt a range of sanctions against SA, including the "prohibition of all new contracts in the nuclear field".

SA's nuclear rapport with Britain, West Germany and France is now virtually non-existent.

In 1965 the US supplied SA with its first research reactor — Safari 1 — using 90% enriched fuel (also supplied from the US).

Sole regards the EORSA as the end of a long period of co-operation.

The co-operation began in wartime London when a British cabinet member asked Jan Smuts to investigate reported deposits of radioactive minerals in Southern Africa as the US was developing the atom bomb.

Confirmation of the area's uranium potential led to the conclusion, from 1950 onwards, of successive contracts between SA and the US.

SA was one of only seven Western countries invited to participate in the initial discussions of President Dwight Eisenhower's Atoms for Peace Programme, which led to the founding of the IAEA in Vienna.

The bottom line of SA's nuclear isolation is near-total dependence on the country's "native genius" of which, Sole argues, there is no shortage. And there is no lack of raw materials.

The question mark is finance.

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